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flasks were opened. No living bacteria were present in any of them, nor were the fluids able to produce tubercles when added to the roots of plants growing in sterile earth. Under these conditions the germs were not able to assimilate free nitrogen.

8. It is not clear in just what way the tubercles originate. Their production is due to the action of specific organisms, but these are not always capable of causing them, as the frequent failures showed. The author was not able to produce them by direct inoculations, not even in the tissues of young roots and stems. He thinks that possibly infection takes place only through young root hairs. Contrary to Laurent, the time of year makes no difference; neither does the age of the plant, as Nobbe has also shown, since tubercles were obtained both on the roots of seedlings and on those of well-developed plants. Gain's observation that infections are more numerous in a damp soil is confirmed.

ERWIN F. SMITH.

**Recent Studies of Asarum.** — The wild gingers of the Eastern and Middle United States, concerning the specific definition of which some doubt has long been felt, form the subject of papers by Bicknell in the *Bulletin of the Torrey Botanical Club* for November last, Ashe in the first part of the current volume of the *Journal of the Elisha Mitchell Scientific Society*, and Kraemer in the *American Journal of Pharmacy* for March. In commenting on some of these papers in the *Journal of Botany* for March, James Britten and Edmund Baker analyze the synonymy of certain of the species and call rather emphatic attention to the desirability of consulting types in serious systematic work. Some slight bibliographic confusion is likely to result from the publication of Mr. Ashe's paper in separate form long enough before the number of the *Journal* containing it was issued to enable him to revise the latter into quite a different article. T.

**Combs's Flora of Santa Clara Province, Cuba.** — The island of Cuba is one of considerable interest to the botanist, as is shown by the rich collections made by many early explorers. In recent years, however, the region seems to have been neglected. We have before us a contribution of considerable length devoted to the flora of Cienfuegos, province of Santa Clara, by Robert Combs.<sup>1</sup> The author enumerates 713 species, of which *Caesalpinia cubensis*, *Acacia*

<sup>1</sup> Plants Collected in the District of Cienfuegos, Province of Santa Clara, Cuba, in 1895-1896. *Trans. Acad. Sci. of St. Louis*, 7: 393-491, pls. 30-39, one map, 1897. (Contributions Botanical Department, Iowa State College of Agric. and Mechanic Arts, No. 7.)

*polypyrgenes*, *Rondeletia combsii*, *Catesbaea nana*, *Anaethropia northropiana*, *Tabebuia petrophila*, and *Chloris eleusinoides*, var. *vestita*, are new. In addition to the enumeration of the species, full notes on the abundance and character of the soil on which the plants occurred are given. Ecologically, the flora may be divided into seven regions: (1) the maritime, (2) the river bottoms, (3) inland swamps or "cienegas," (4) upland woods, (5) the mountain regions, (6) the savannahs or wooded grass lands, and (7) a kind of arid, desert-like region. Each region has many typical plants. These regions, however, grade into each other; some plants occur in one or more regions. The orders Leguminosæ, Compositæ, Rubiaceæ, Euphorbiaceæ, Malvaceæ, and Gramineæ lead in point of numbers, and it is probable that the Gramineæ and Cyperaceæ are more numerous than given in the catalogue, and that the number could be considerably augmented by another season's collecting. It is to be hoped that Mr. Combs may again visit this region. The catalogue is, however, a representative one, since the collecting was done during both the dry and the wet season, the dry season, when Compositæ are most abundant, corresponding to our winter. The determinations were made by J. M. Greenman, of Cambridge, who is well qualified to speak on the Cuban flora, having previously studied the Northrop collection. The paper contains the vernacular Spanish names, and these are quite numerous because of the many uses that Cubans make of the native plants for medicinal purposes. Mr. Combs has further given a short account of Cuban medical plants in another paper.<sup>1</sup>

L. H. PAMMEL.

**Central American Botany.** — Captain J. Donnell Smith, who for a number of years has been concentrating his energy on the Central American flora, publishes his twentieth installment of descriptions of new plants from Guatemala and other Central American republics in the *Botanical Gazette* for March. One new genus, *Prosthecidiscus*, of the Asclepiadaceæ, is characterized and well figured.

**Epiphyllous Flowers.** — The knowledge of this unusual type of inflorescence, summarized by C. de Candolle<sup>2</sup> and Gravis<sup>3</sup> a few years since, is enriched by a study of *Chirita hamosa* conducted under the direction of Professor Warming, of the Copenhagen Uni-

<sup>1</sup> Some Cuban Medical Plants. *Pharmaceutical Review*, 15: 87-91, 109-112, 136, 1897.

<sup>2</sup> *Mém. Soc. de Phys. et d'Hist. Nat. de Genève*, 1890, suppl. vol.

<sup>3</sup> *Comptes Rend. Soc. Roy. de Bot. de Belg.*, 1891.